This project would construct an additional lane in each direction, with construction extending from west of the El Dorado Hills Undercrossing (UC) to east of the South Shingle Road/Ponderosa Road overcrossing (Figure 1). The project would continue from the HOV lanes currently under construction west of the project area. The western end of the project, from approximately KP 0.25 (PM 0.16) to approximately KP 1.31 (PM 0.81) would involve restriping where the previous HOV lanes transition back to two mixed-use lanes. Actual widening in the median would begin at approximately KP 1.31 (PM 0.81). The eastbound lane would end east of the eastbound on-ramp just past South Shingle Road/Ponderosa Road overcrossing to avoid a bottleneck and to provide a smooth transition back to two lanes. The lanes would be constructed within the existing median, taking advantage of the existing facilities by increasing their capacity and operating them more efficiently. The outside widening required for this project would be in the vicinity of the Bass Lake Grade Truck Climbing Lane, which would require additional widening of approximately 2.4 m (7.9 ft) on the outside eastbound lane. Typical cross-sections are provided in Figures 2a-2c.

Bridge Modifications/Median Closures
The addition of lanes within the median of U.S. 50 would require that the following structures be widened to the inside: Latrobe Road UC, Clarksville UC, Bass Lake UC, Cameron Park UC.

Lighting Improvements
Improvements to existing safety lighting to current standards are proposed at the following interchanges: El Dorado Hills Boulevard, Bass Lake Road, Cameron Park Drive, Cambridge Road, and South Shingle/Ponderosa Road. Upgrades may include moving or adding lighting to improve coverage at the interchanges.

New Overlay for Existing Roadway
When the addition of the new lanes is complete, and prior to installation of guard rail, the project proposes to grind the open-graded asphalt-concrete (AC) overlay of the existing roadway and apply new AC overlay on the entire roadway.

CHP Enforcement Areas
During final design, Caltrans would coordinate with the California Highway Patrol (CHP) regarding the location of CHP enforcement areas to discourage violation of the HOV lanes.

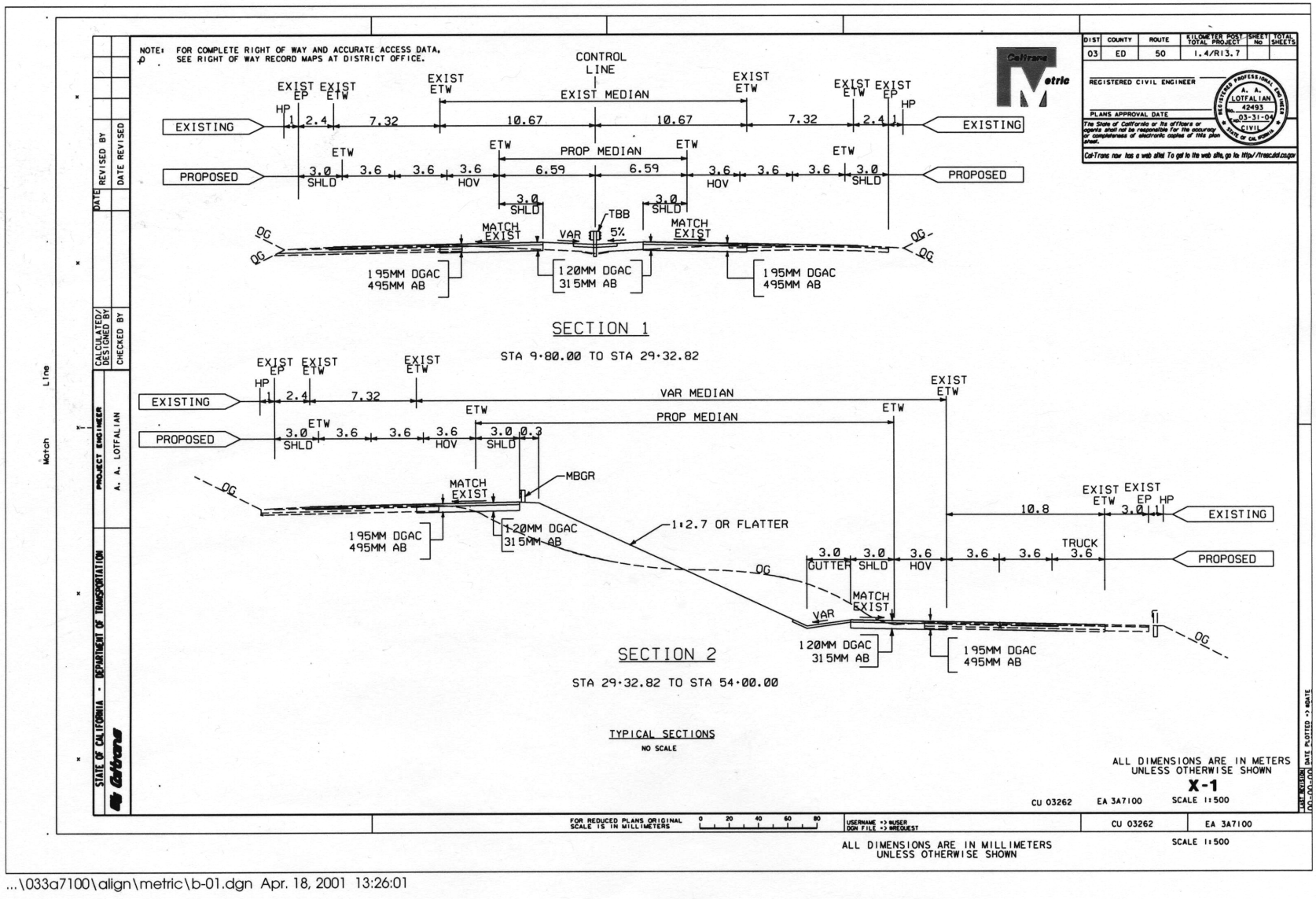
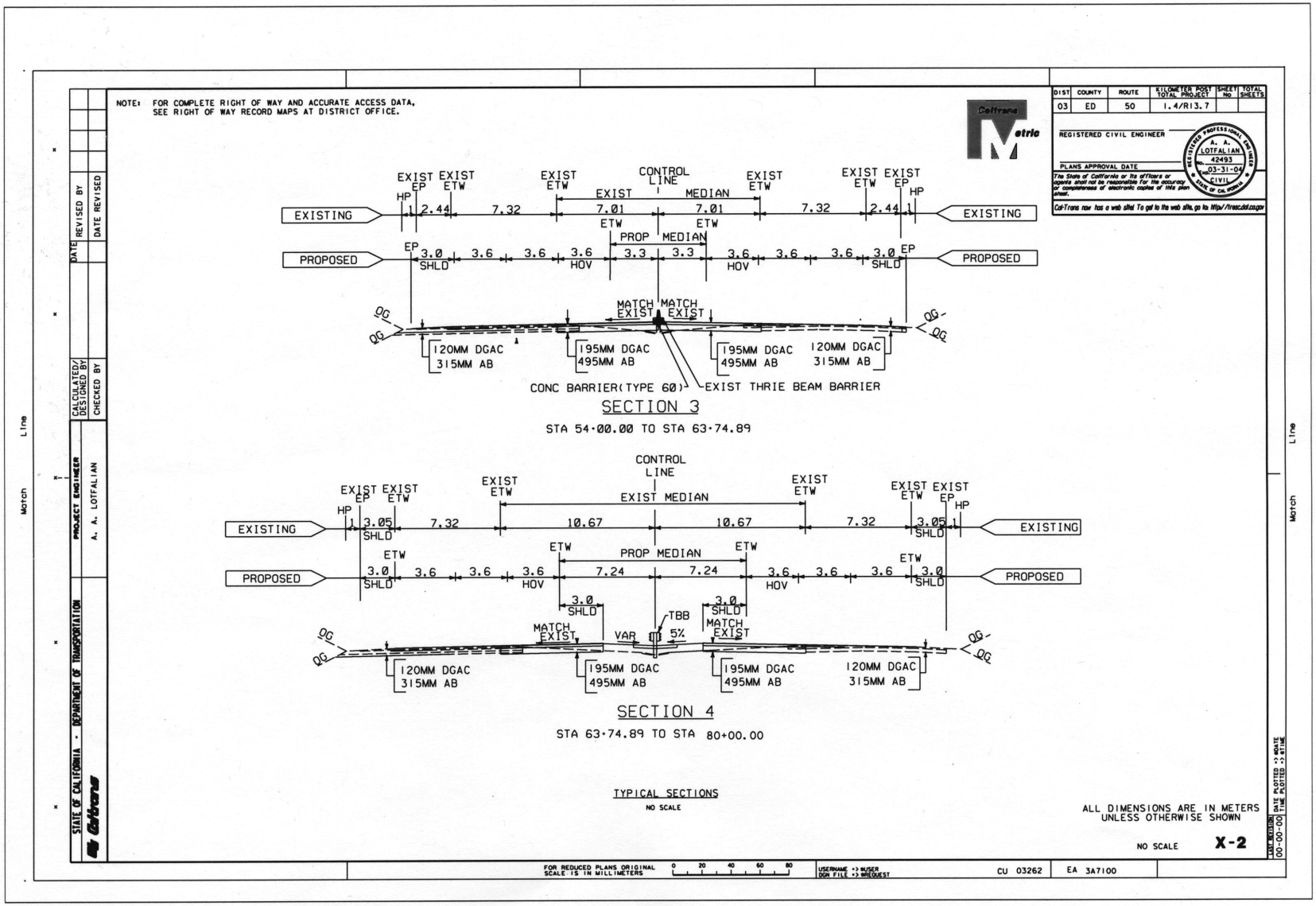
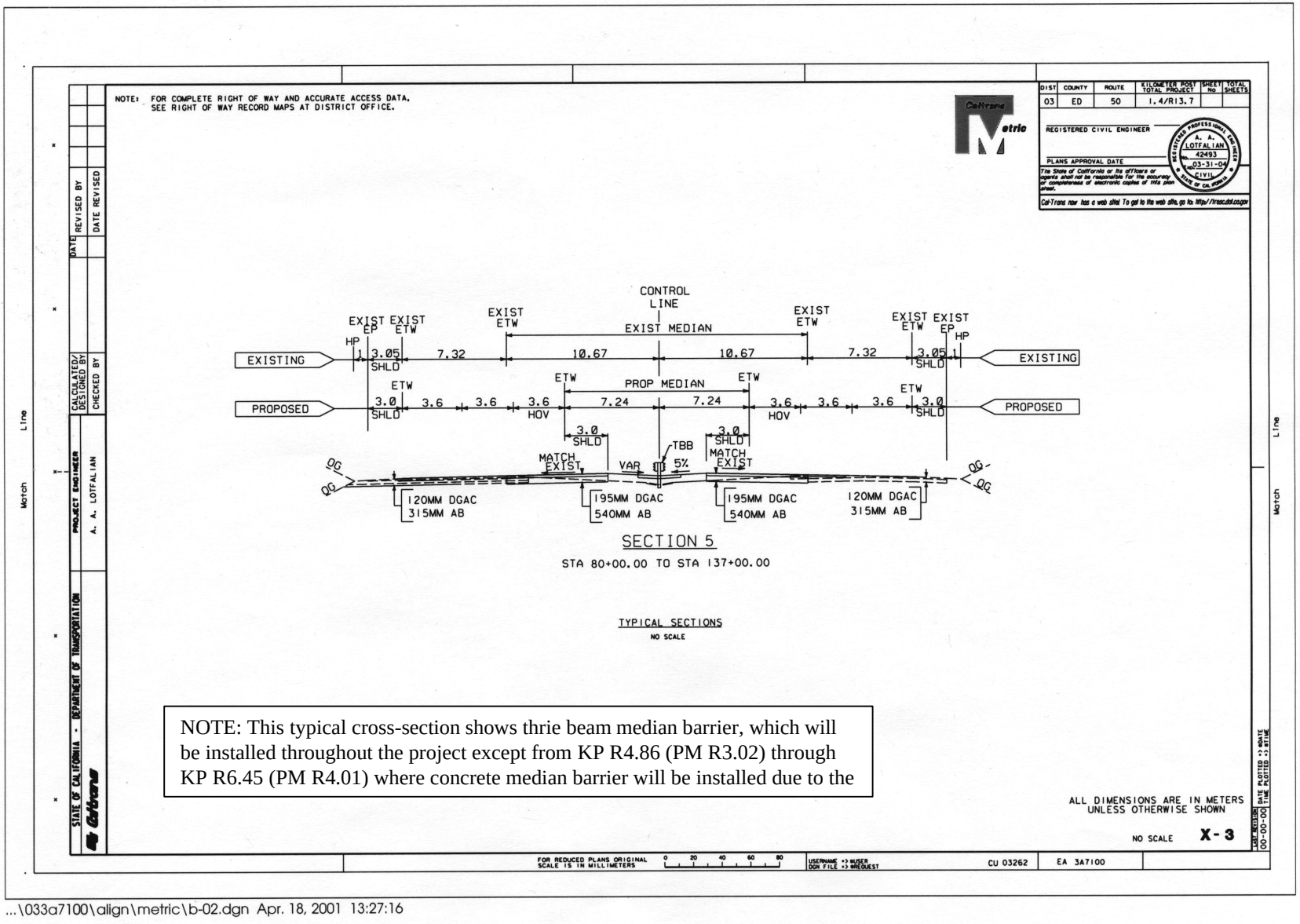


Figure 2a Typical Cross-Sections



...\033a7100\align\metric\b-02.dgn Apr. 18, 2001 13:26:46

Figure 2b Typical Cross-Sections



NOTE: This typical cross-section shows thrie beam median barrier, which will be installed throughout the project except from KP R4.86 (PM R3.02) through KP R6.45 (PM R4.01) where concrete median barrier will be installed due to the

Figure 2c Typical Cross-Sections

Park-and-Ride Facilities
Several park-and-ride facilities are located along the U.S. 50 corridor in El Dorado County. These lots are utilized heavily by car-poolers as well as transit users. El Dorado County maintains some of the lots, while Caltrans maintains others. This project recommends that Caltrans-owned park-and-ride lots be assessed and rehabilitated, as necessary, during the construction of this project.

Median Barrier and Paving
Median barriers are proposed throughout the length of the project. Median barrier treatment would depend on median width. For example, near Bass Lake Road, the median width would be 6.6 m (21.7 ft). In this area, the median would be paved with a concrete barrier (Type 60) separating eastbound and westbound traffic. Between El Dorado Hills Boulevard and Clarksville UC, and east of Bass Lake Road to South Shingle Road/Ponderosa Road the median width would be 14.0 m (45.9 ft); in these areas, a continuous double row of metal beam median barrier has been proposed.

Sound Walls
An Environmental Noise Analysis was conducted as part of the environmental process for this project to determine the potential for noise impacts related to changes in projected traffic volumes. The study measured existing noise levels and evaluated potential future noise levels with and without the proposed project. The noise study report indicates that, with either of the build alternatives, noise abatement (sound walls) is reasonable and feasible on the north side of U.S. 50, west of Cameron Park Drive (Appendix A). Preliminary information on the physical characteristics of potential sound walls (e.g., physical location, length, and height) is provided in Section 5 of this document. The final design of sound walls (if constructed) would be based on final project design.

Design Exceptions
The proposed improvements would conform generally to current Caltrans design standards for lane and shoulder widths. However, within existing 14.0 m (45.9 ft) median areas, an exception by Caltrans to advisory standard would be required for non-standard median width (6.6 m [21.7 ft] in lieu of 10.8 m [35.4 ft]). Non-standard outside shoulder widths are located within the project limits, particularly at structures. At these locations, the shoulder width is 2.67 m (8.8 ft) in lieu of 3.0 m (9.8 ft). These shoulders may need to be widened to bring them up to current standards; otherwise, a design exception to an advisory standard would need to be acquired.

Ramp Metering and HOV Bypass Lanes
Ramp metering and HOV bypass lanes are not part of the proposed project. The need for these features would be studied for each interchange location in the project area as part of a future project(s).

Phasing

To provide options for obtaining funds for the proposed project, Caltrans prepared estimates for three construction scenarios (Table 5). Option A would construct the two lanes under one contract at an estimated cost of $32 million. Two other options would construct the project in two phases.

Under Option B, Phase 1 would include construction of the entire westbound lane and construction of the eastbound lane from KP 0.3 (PM 0.19) to one-half mile beyond the Latrobe Road Interchange eastbound on-ramp. Estimated cost to construct Phase 1 is $24.2 million. To complete construction of the project in Phase 2 would cost an additional $13.4 million for a total estimated cost of $37.6 million; an increase of $5.6 million, due to a number of factors including escalation of unit costs.

Under Option C, Phase 1 would include construction of the westbound lane and Phase 2 would include construction of the eastbound lane. The estimated cost of Phase 1 under this option would be $23.1 million, while the estimated cost of Phase 2 would be $16.8 million, bringing the total cost to $39.9 million. Estimated costs under the phasing scenarios are in present dollar value. Phase 2 would need to be constructed by 2015 to meet expected traffic demand. If Phase 2 is not constructed within five years of approval of the final environmental document for this project, a new environmental review may be required, resulting in additional support costs not reflected in the above estimates.

2.2.2 Alternative 1, Add HOV Lanes

A high-occupancy vehicle (HOV) lane (also known as a carpool lane) is a protected lane usually located in the middle of freeways; it is used by buses, vanpools and carpools to carry more than one passenger at a time. In the proposed project, an HOV lane would be added in each direction from approximately El Dorado Hills Boulevard/Latrobe Road [KP 0.25 (PM 0.16)] to east of Ponderosa Road/South Shingle Road at approximately KP R14.67 (PM R9.11). Design and operational details of the proposed HOV lanes are:

- Contiguous 3.6 m (12 ft) HOV median lane
- Standard signing and pavement markings for the HOV lane
- Two 3.6 m (12 ft) mixed-flow lanes
- 4.2 m (14 ft) or greater continuous median enforcement area where possible
- 3.0 m (10 ft) median shoulder for remainder of project
- 3.0 m (10 ft) minimum outside shoulder
- Vehicle occupancy requirement of two or more passengers with motorcycles and “Clean Air Vehicles” allowed
- Peak-period operation (6 to 10 AM and 3 to 7 PM) in both directions

The standard design characteristics for HOV lanes can be found in Caltrans' HOV Guidelines. For this project, a contiguous HOV lane is recommended because the unrestricted access it provides would promote a higher level of HOV lane usage and would match the design of the successful HOV lane on Route 99.

Operational characteristics (occupancy requirement and time of operation) for the HOV lanes were selected for regional consistency with the existing HOV lanes on Route 99 and the HOV lanes on I-80 and U.S. 50 that are planned or under construction. These characteristics are subject to verification based on freeway operations when the project is completed. For example, if the HOV lanes were to become congested and operate poorly, it would be necessary to increase the occupancy requirement.

In addition to the HOV lanes, traffic studies for this alternative included the HOV lanes west of El Dorado Hills Boulevard/Latrobe Road that are under construction and the proposed interchange at Silva Valley Parkway (Figures 3a-3b).

2.2.3 Alternative 2, Add Mixed-Flow Lanes

A mixed-flow lane would be added in each direction from El Dorado Hills Boulevard/Latrobe Road to just east of Ponderosa Road/South Shingle Road. Design and operational details of a mixed-flow lane are typically the same as that of an HOV lane; however, no CHP enforcement areas or special signing and pavement markings would be required:

- Contiguous 3.6 m (12 ft) median lane
- 3.6 m (12 ft) mixed-flow lanes
- 3.0 m (10 ft) median shoulder for remainder of project
- 3.0 m (10 ft) minimum outside shoulder

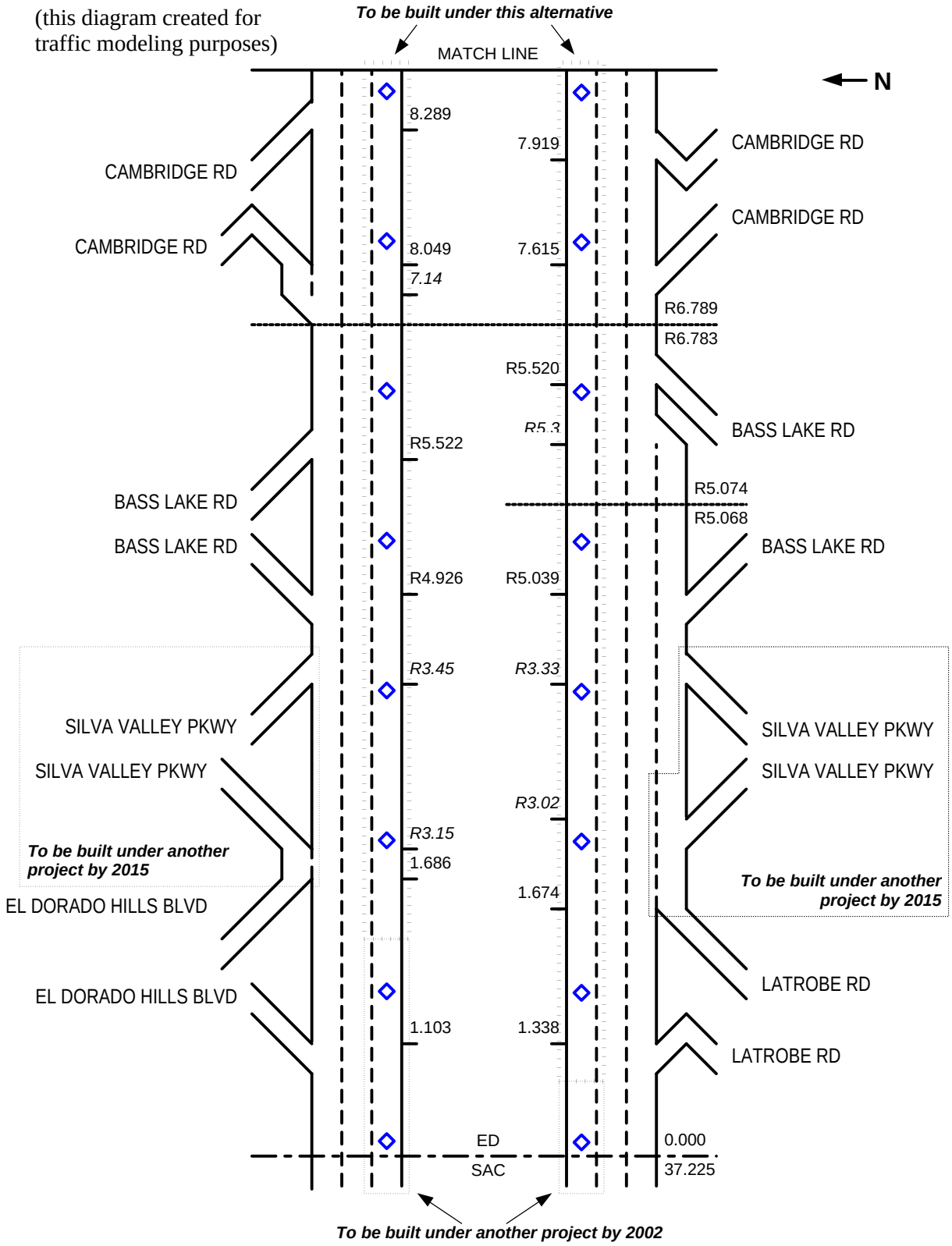
As with the other two alternatives, traffic studies for this alternative included the HOV lanes west of El Dorado Hills Boulevard/Latrobe Road that are under construction and the proposed interchange at Silva Valley Parkway (Figure 4a-4b). The adjacent HOV lanes are assumed to be in place by 2002, and the new interchange by 2015.

In the westbound direction, the additional mixed-flow lane would end adjacent to the HOV lanes being built under a separate project. This situation requires special consideration because HOV lanes are typically started as an added lane to the freeway. The added lane prevents single-occupant vehicles from being "trapped" or forced into an HOV lane. To create the added lane for the start of the HOV lane at this location, widening to the outside at the Latrobe Road UC would be needed to provide the standard lane drop and add tapers.

The other option would be to make the third lane exit only to El Dorado Hills Boulevard, which may inadvertently trap through traffic. This configuration would require widening the bridge to the outside, which may interfere with the proposed interchange reconstruction at this location. The end of the proposed HOV lane in the eastbound direction would not be modified under this alternative.

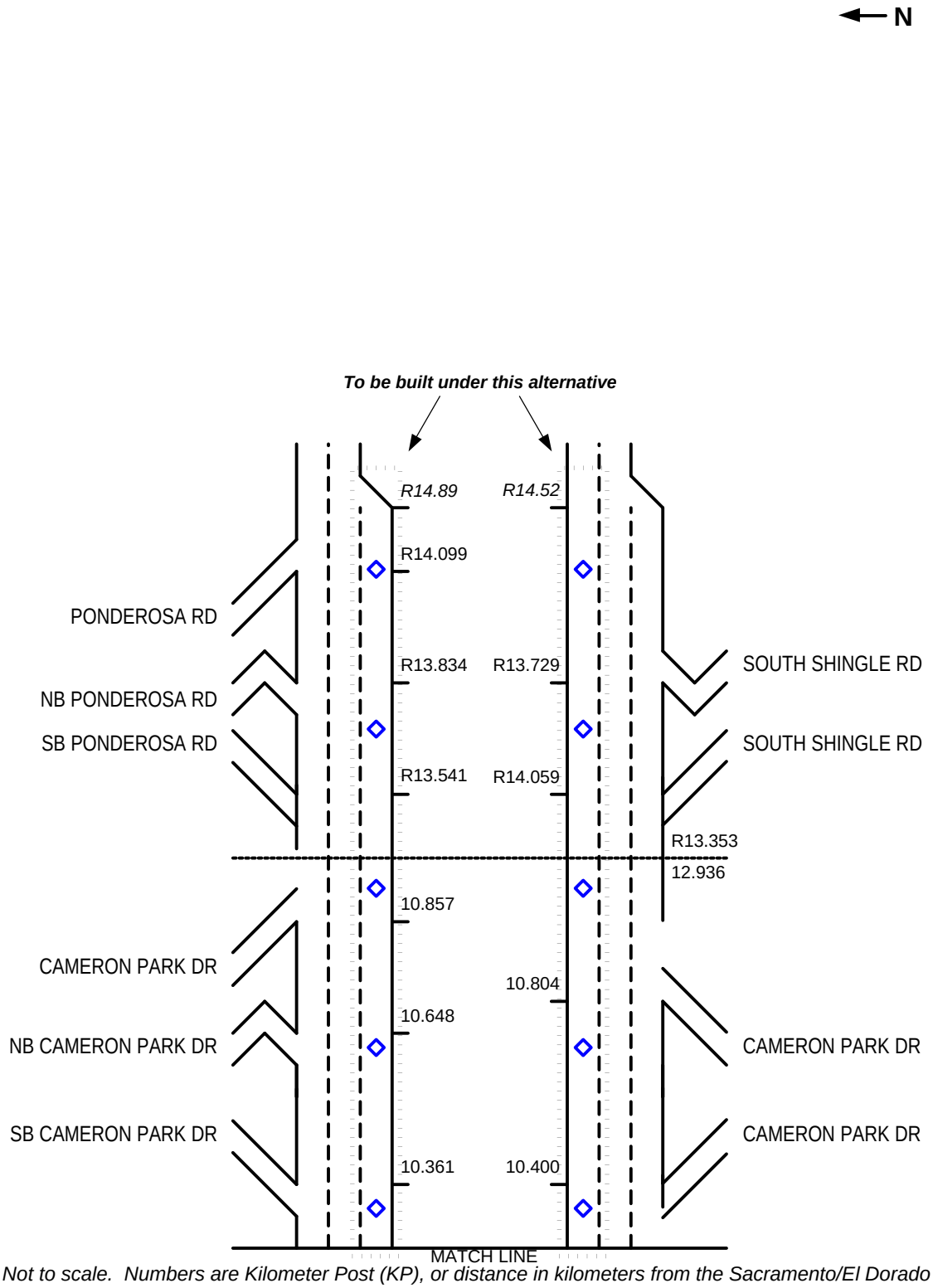
LANE CONFIGURATION DIAGRAMS

Figure 3a
Add HOV Lanes
(this diagram created for traffic modeling purposes)



Not to scale. Numbers are Kilometer Post (KP), or distance in kilometers from the Sacramento/El Dorado County line. Italics denote estimated KP. Please refer to Appendix C for this figure in English units (post miles).

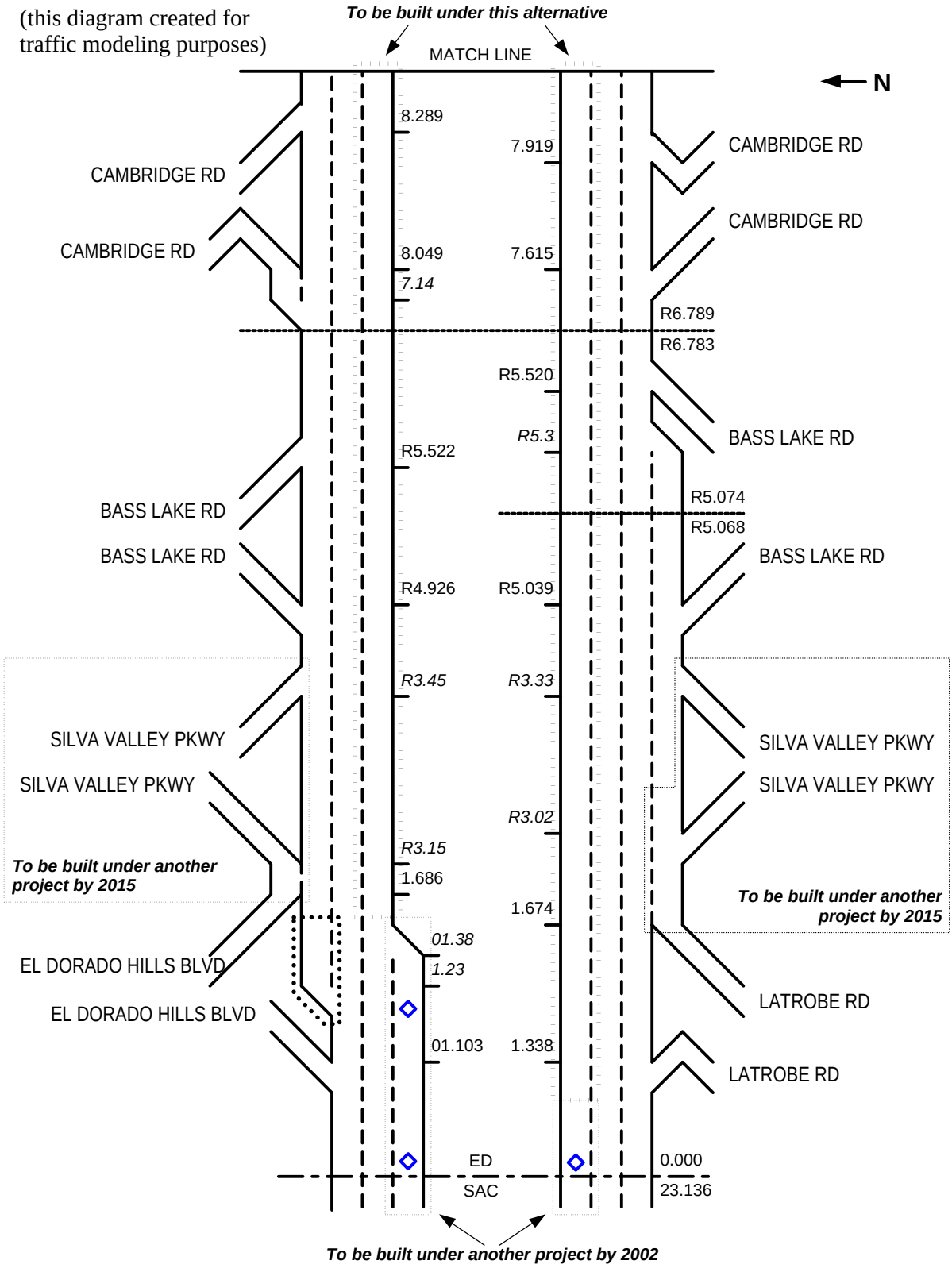
Figure 3b
Add HOV Lanes, continued
(this diagram created for
traffic modeling purposes)



Not to scale. Numbers are Kilometer Post (KP), or distance in kilometers from the Sacramento/El Dorado County line. Italics denote estimated KP. Please refer to Appendix C for this figure in English units (post miles).

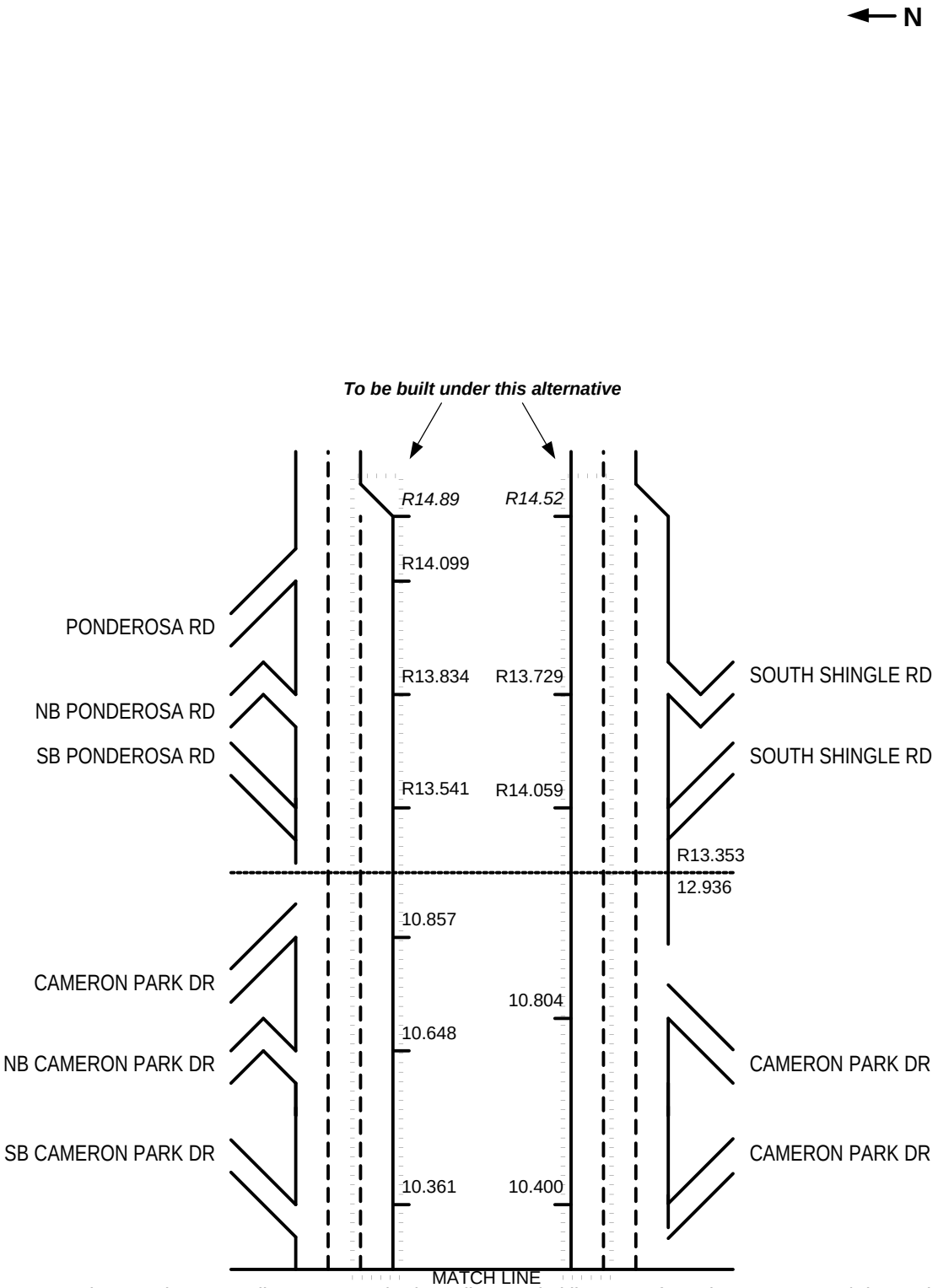
LANE CONFIGURATION DIAGRAMS

Figure 4a
Add Mixed Flow Lanes
(this diagram created for traffic modeling purposes)



Not to scale. Numbers are Kilometer Post (KP), or distance in kilometers from the Sacramento/El Dorado County line. Italics denote estimated KP. Please refer to Appendix C for this figure in English units (post miles).

Figure 4b, continued
Add Mixed Flow Lanes
(this diagram created for
traffic modeling purposes)



Not to scale. Numbers are Kilometer Post (KP), or distance in kilometers from the Sacramento/El Dorado County line. Italics denote estimated KP. Please refer to Appendix C for this figure in English units (post miles).

2.2.4 No-Build Alternative

Under CEQA, environmental review must consider the effects of not implementing the proposed project. The no-build alternative represents the existing condition of the facility plus the improvements west of El Dorado Hills Boulevard/Latrobe Road and at Silva Valley Parkway. The HOV lane project between Sunrise Boulevard and El Dorado Hills Boulevard is under construction and studies assumed that project to be complete by 2002. The Silva Valley Parkway interchange and associated auxiliary lanes are planned for completion in 2008, so these should be in place by 2015.

Although the adjacent projects will provide some operational improvements, the bottlenecks in the westbound and eastbound directions near the El Dorado Hills Boulevard/Latrobe Road interchange will continue to lead to congestion during peak periods. As volumes increase over time, new bottlenecks will form and the operation of the freeway will continue to degrade to a Level of Service to "F" for the entire project area by year 2007**.** As congestion worsens, so will air quality along the corridor. Fire, police, and emergency medical services will be negatively impacted by the no-project alternative. Adjacent communities and other destinations, likewise, could experience economic impacts with the no-project alternative.

2.2.5 Comparison of Alternatives

After comparing and weighing the benefits and impacts of all of the feasible alternatives, some of which are summarized in Table 5 below, the Caltrans team has identified Alternative 1, Add HOV Lanes as the preferred alternative (subject to public review). Final selection of a project alternative would occur subsequent to the public review and comment period.

Table 5: Comparison Summary of Alternatives

	Alt. 1, Add HOV Lanes ***Preferred Alternative****	**Alt. 2, Add Mixed-Flow Lanes**	**No Project**
Air Quality improvement?	Yes	Yes	No
Environmental Impacts?	Mitigation measures would reduce minor impacts	Mitigation measures would reduce minor impacts	Increased congestion would lead to increased vehicle pollutant emissions
Conforms with State Implementation Plan for Air Quality?	Yes	Yes	No
Meets Purpose and Need?	Yes	No	No
Safety improvement?	Most improvement, due to reduction in vehicle miles traveled	Some improvement	No improvement
Project Capital Cost :			
Option A One phase	$32 million	$32 million	
Option B Phase 1: $24.2 M Phase 2: $13.4 M	$37.6 million	$37.6 million	--
Option C Phase 1: $23.1 M Phase 2: $16.8 M	$39.9 million	$39.9 million	

*Alternative 1, Add HOV Lanes has been identified as the preferred alternative. However, selection of a preferred alternative will not occur until after the public circulation period.

Table 6 summarizes the traffic study results for the westbound peak period (6 to 9 AM) for years 1999, 2002, 2015 and 2025 for the three alternatives.

Table 6. Westbound – AM

Year	Alternative	Lane Type	Average Speed	Mainline Delay (< 35 mph)	Freeway Travel Time	Total Travel Distance	
			mph	veh-hrs	veh-hrs	veh-mi	pass-mi
1999	**EXISTING**	MF	52	70	1505	78551	102440
2002	**NO BUILD**	MF	54	65	1529	82106	107165
	ADD HOV	HOV	65	0	177	11496	34506
		MF	63	0	1105	69847	71691
		Total	63	0	1282	81343	106197
	ADD MF	MF	64	1	1312	83746	109301
2015	**NO BUILD**	MF	28	1185	3478	87714	114815
	ADD HOV	HOV	65	0	273	17729	49140
		MF	33	687	2683	78806	81966
		Total	37	687	2956	96535	131106
	ADD MF	MF	30	1261	3494	105676	138261
2025	**NO BUILD**	MF	24	1620	4760	86518	113442
	ADD HOV	HOV	65	0	342	22210	59884
		MF	23	1577	4974	83309	87077
		Total	27	1577	5315	105519	146961
	ADD MF	MF	20	2916	6100	113909	149265

The formula for vehicle-miles as used in the table above follows:

Vehicle-miles = flow rate (vehicles per hour) x time of the simulation (total number of hours) x length off the section modeled (miles) x number of lanes

Passenger-miles = total number of vehicle-miles x average occupancy rate (persons/vehicle)

Table 7 summarizes the traffic study results for the eastbound peak period (3 to 6 PM) for years 1999, 2002, 2015 and 2025, for the three alternatives.

Table 7. Eastbound– PM

Year	Alternative	Lane Type	Average Speed	Mainline Delay (< 35 mph)	Freeway Travel Time	Total Travel Distance	
			mph	veh-hrs	veh-hrs	veh-mi	pass-mi
1999	**EXISTING**	MF	64	0	1225	77899	113114
2002	**NO BUILD**	MF	63	2	1270	80549	117026
	ADD HOV	HOV	65	0	232	15095	47115
		MF	65	0	1017	66001	70532
		Total	65	0	1249	81096	117648
	ADD MF	MF	65	0	1266	82286	119573
2015	**NO BUILD**	MF	50	180	2179	104464	152050
	ADD HOV	HOV	65	0	387	25146	74279
		MF	63	0	1355	85850	93829
		Total	64	0	1742	110996	168108
	ADD MF	MF	64	0	1779	114527	166753
2025	**NO BUILD**	MF	47	259	2586	109849	160117
	ADD HOV	HOV	65	0	476	30717	88228
		MF	50	191	1897	93495	103267
		Total	53	191	2374	124212	191495
	ADD MF	MF	57	121	2368	130996	190981

The formula for vehicle-miles as used in the table above follows:

Vehicle-miles = flow rate (vehicles per hour) x time of the simulation (total number of hours) x length off the section modeled (miles) x number of lanes

Passenger-miles = total number of vehicle-miles x average occupancy rate (persons/vehicle)

2.2.5.1 Discussion

The No Build Alternative resulted in the most delay and lowest average mainline speeds, and would move the least number of vehicles and people of the three alternatives. In both directions, bottlenecks at Bass Lake Road control the operation of the freeway in future years causing significant queuing outside the study area. This results in average speeds in 2025 of 24 mph westbound and 47 mph eastbound. This alternative would not promote ridesharing, nor would it do anything to accommodate the planned growth on the U.S. 50 corridor. Therefore, the no-build option should not be considered as a viable alternative.

The HOV lanes in the HOV Lanes Alternative operated at free-flow speeds for all future years (2002, 2015 and 2025). In the westbound direction, the mixed-flow lanes of the HOV Lanes Alternative are free-flow in 2002, have a bottleneck at the El Dorado Hills Boulevard on-ramp in 2015, and have a second bottleneck at the Bass Lake Road on-ramp in 2025. In contrast, Mixed Flow Lanes Alternative has congestion for all future years, although the congestion in 2002 is minor. The bottleneck occurs at El Dorado Hills Boulevard on-ramp because the two mixed-flow lanes can not accommodate the on-ramp traffic. In 2025, the average peak-period speed for the HOV Lanes Alternative is higher (27 mph) than the Mixed Flow Lanes Alternative (20 mph). Also, the HOV Lanes Alternative has nearly half (54 percent) of the congestion delay experienced under the Mixed Flow Lanes Alternative. For the westbound direction, the add-HOV Lanes Alternative provides better freeway operations.

In the eastbound direction, the HOV Lanes Alternative has free-flow conditions for all lanes for 2002 and 2015, but the end of the HOV lane causes congestion in 2025. Similarly, the Mixed Flow Lanes Alternative is free-flow for 2002 and 2015, but the lane drop at the end of the third lane is a bottleneck in 2025. The performance of the two build alternatives is very similar for 2002 and 2015. In 2025, the Mixed Flow Lanes Alternative has a better average peak-period speed (57 versus 53 mph) and less congestion delay (121 versus 191 vehicle-hours). Therefore, the Mixed Flow Alternative performs better in the eastbound direction in 2025.

The Caltrans HOV Guidelines state that within the first year after opening, the HOV facility should be carrying a minimum of 800 vehicles per hour (vph) or 1800 passengers per hour during the peak hour. Traffic volumes lower than these minimums could result in an HOV lane that is perceived by the public to be underutilized. These are minimum traffic volumes that would be expected to grow over time. In the westbound direction, the predicted peak-hour volume for the HOV lane in 2002 before the El Dorado Hills Boulevard off-ramp is 610 vehicles per hour (vph). This volume is expected to increase to 930 vph by 2015 and to 1,170 vph by 2025. Assuming a uniform growth rate, the HOV volume would reach 800 vph by 2010. In the eastbound direction, the predicted peak-hour volume for the HOV lane in 2002 after the Latrobe Road on-ramp is 770 vph. This volume is expected to increase to 1,160 vph by 2015 and to 1,410 vph by 2025. Again, assuming a uniform growth rate, the HOV volume would attain the 800 vph level in 2003.

Although the HOV lane is not predicted to meet the first-year criteria of 800 vph, past experience has shown significant increases in the volume of HOVs. In the past eleven years, for example, the peak-hour HOV volume on northbound Route 99 at 47th Avenue has increased from 17

percent to 27 percent. (This predicted increase in HOVs has been factored into the predicted future demand volumes.) After the completion of the first section of the HOV lane, the peak-hour volume was 1,175 vph. By 2000, the HOV lane had been extended to the north and to the south of the original segment and the volume had increased to 1,720 vph. Given the success of the Route 99 HOV lane, it is likely that an HOV lane on U.S. 50 will be well used.

2.2.5.2 Conclusion

The HOV Lanes Alternative is superior to the Mixed Flow Lanes Alternative and the No-Build Alternative. Although the Mixed Flow Lanes Alternative performs slightly better in the eastbound direction, the HOV Lanes Alternative provides a significantly better operation for the westbound direction of U.S. 50. The HOV lanes are not predicted to meet the Caltrans guideline for a first-year, peak-hour volume of 800 vph; however, the volume in the eastbound direction should reach 800 vph by 2003 (Tables 6 and 7). The HOV lanes would increase the efficiency of the freeway by moving more passengers per vehicle, which can reduce congestion along the corridor and reduce vehicle pollutant emissions. Additionally, HOV lanes encourage the use of transit systems and provide a reliable transit alternative to commuting alone. Therefore, the HOV Lanes Alternative is recommended.

Benefits of the Preferred Add HOV Lanes Alternative

- quicker trips for those who carpool, vanpool, or take buses
- reduced congestion on the freeway and on parallel roads
- increased carrying capacity of U.S. 50
- maximized use of existing and planned park-and-ride facilities
- improved air quality

2.3 Alternative Considered but Eliminated from Further Discussion: Light Rail in Median

The proposed project was the result of efforts by a Caltrans multi-disciplinary project team to identify and study a range of alternatives for the proposed project. Besides the addition of HOV lanes and mixed-flow lanes, provisions for extension of light rail transit was considered. Reserving the median for a light rail extension at some point in the future has a number of disadvantages, including difficulty of access to stations, high capital cost particularly at stations, and the difficulty and high cost of connecting efficiently to an adjacent line whose terminus most likely would be outside the U.S. 50 right of way (Highway 50 Corridor Capacity Study 12/98).

The detailed study of light rail extension is beyond the scope of this document. However, preliminary analysis shows that opportunities to construct a viable rail system consistent with the limited funds available are limited. Within the project area the grade is steep, making construction of light rail facilities difficult and expensive. Furthermore, current congestion